

REMARKS

Reconsideration of the above-identified application, as amended, is respectfully requested.

In the Official Action dated January 9, 2003, the Examiner first objected to the drawings as requiring that Figures 8 and 9 be provided with the legend "Prior Art". Applicants, in response, enclose drawing sheets including proposed changes to Figures 8 and 9 to indicate these as prior art as indicated in red ink. Applicants respectfully request the Examiner to consider and approve of these proposed drawing changes to Figures 8 and 9. Further in the Office Action, the Examiner rejected Claims 1-15 under 35 U.S.C. §103(a), as being unpatentable over Endo (U.S. Patent No. 5,852,430) (hereinafter "Endo") in view of Sato (U.S. Patent No. 5,956,006) (hereinafter "Sato").

With respect to the Examiner's rejection of independent Claims 1, 5, 8 and 12 as being unpatentable over the combination of Endo taken in view of Sato, applicants respectfully traverse.

The present invention is generally directed to setting a color temperature of a white point, e.g., at a highest gray level, in an LCD display device, and making an adjustment so as to maintain a color temperature substantially constant at each gray level. Particularly, the present invention directed to a white point adjustment methodology and apparatus for adjusting white color coordinates at any gray level of white precisely on the CIE (chromaticity diagram). According to the invention, this is achieved by changing the combination ratio of R/G/B sub-pixel light intensity (luminance) of 8 bits with higher bit accuracy (e.g., 10 bits), resulting in adjust gamma characteristics of R/G/B (as claimed in Claim 4). The adjustment to an accuracy of 10 bits makes very smooth gamma curve in even

the basic color of red/green/blue in addition to white. This, it is respectfully submitted, is a significantly distinguished effect from the Endo and Sato references.

Endo's patent is applied onto 'birefringence' type LC (Electrically controlled birefringence: ECB mode LC) which realizes color display by applying an appropriate voltage to LC so that LC can transmit only a certain wave length light to display a certain color. Consequently, Endo's display system does not have sub-pixels with color filter such as Red/Green/Blue. As described in Endo, color will change from white to red, blue on color locus of birefringence type LC, and then green with increasing applied voltage. Thus, in Endo, color is not changed with the combination of sub-pixels of R/G/B. The point of Endo is that color, for example white applied at certain voltage, will change with ambient temperature, e.g., from white to red due to characteristics of birefringence type LC. To avoid such a deviation of color, Endo settles a threshold ambient temperature (by use of ambient temperature sensors (circuit 35 of Figure 4 of Endo). It is a key difference that Endo is concerned with color changes due to ambient temperature, and NOT a color temperature adjustment as in the present invention. As known, color temperature is defined as the measurement of the color of light radiated by an object (a black body) while it is being heated. This measurement is typically expressed in terms of absolute scale, or degrees Kelvin, with lower Kelvin temperatures such as 2400° K being red; higher temperatures such as 9300° K are blue and a neutral temperature being white, at 6504° K. In Endo, below the threshold ambient temperature, a predefined voltage will be applied to LC to display a certain color accordingly. However, above the threshold temperature a displayed color is converged to two colors (white of minimum voltage, green of maximum volt.) by transforming mid. voltages for other colors to maximum voltage to avoid degraded/undesired color due to higher

temperature. Then, only white and green are displayed on screen. The Examiner's reference to Endo at Col. 9, lines 6-13 respectfully is misplaced as this passage does not refer to gray-scale level color, but rather the number of discrete voltage levels that may be applied to a ECB LCD pixel to be adjusted according to the ambient temperature.

Thus, Endo is entirely different from the present invention as claimed in Claims 1, 5, 8 and 12. Endo simply cannot achieve such an effect in any color as in the present invention. That is, the methodology of the invention for adjusting a color temperature of a white point achieves precise adjustment, free adjustment of white coordinates at any gray level and also keeps smooth gray scale such as black to pure green, black to pure red, black to pure blue for each sub-pixel. This results in also providing the method to keep stable white color coordinates at any gray level for useful application.

Respectfully, Sato is of no help in this regard. The system described in Sato's patent, like Endo, is also for ECB (electrically controlled birefringence) type LC. There is no sub-pixels of R/G/B on the LCD either, i.e., a certain voltage is applied onto a pixel of LC to realize a certain color. The novelty of Sato is that color data from a PC system, for example, which consists of an R, G, B combination is converted to one voltage level to enable one pixel of the LCD to display a desired color. The desired color will be approximated by the color of the nearest color coordinates on CIE, which cannot be completely the same color though. Thus, the methodology described in Sato cannot achieve the graduation of a color, for example, black to white with smooth grey scale, black to green with smooth green gray scale, etc. as in the present invention. Sato, thus does not affect the present invention whether taken alone or in combination with Endo because this methodology cannot adjust white coordinates

freely, much less precisely. That is, Sato cannot move the color coordinates of white out of color locus of birefringence type LC on CIE.

In view of the foregoing, the Examiner is respectfully requested to withdraw the rejection of independent Claims 1, 5, 8 and 12 and all remaining claims dependent either directly or indirectly thereupon.

In view of the foregoing remarks herein, it is respectfully submitted that this application is in condition for allowance. Accordingly, it is respectfully requested that this application be allowed and a Notice of Allowance be issued. If the Examiner believes that a telephone conference with the Applicants' attorneys would be advantageous to the disposition of this case, the Examiner is requested to telephone the undersigned, Applicants' attorney, at the following telephone number: (516) 742-4343.

Respectfully submitted,



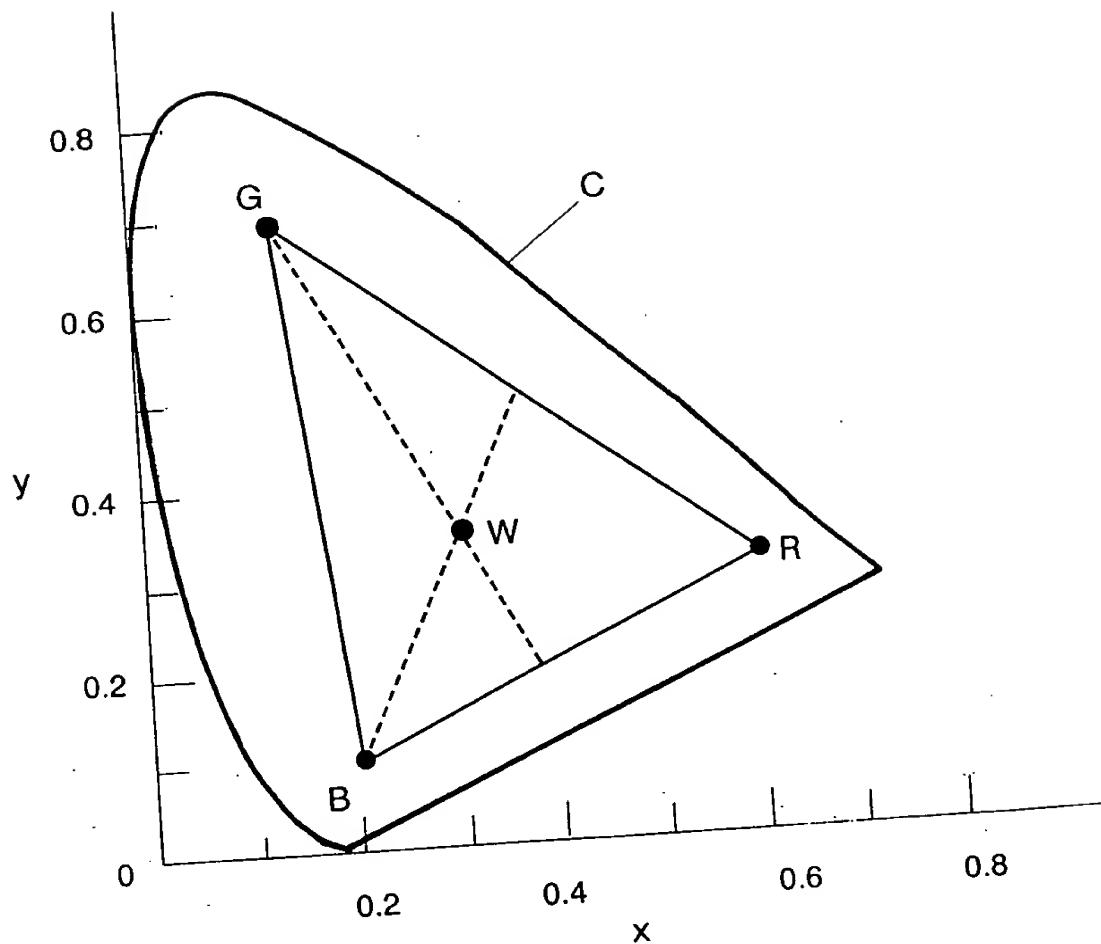
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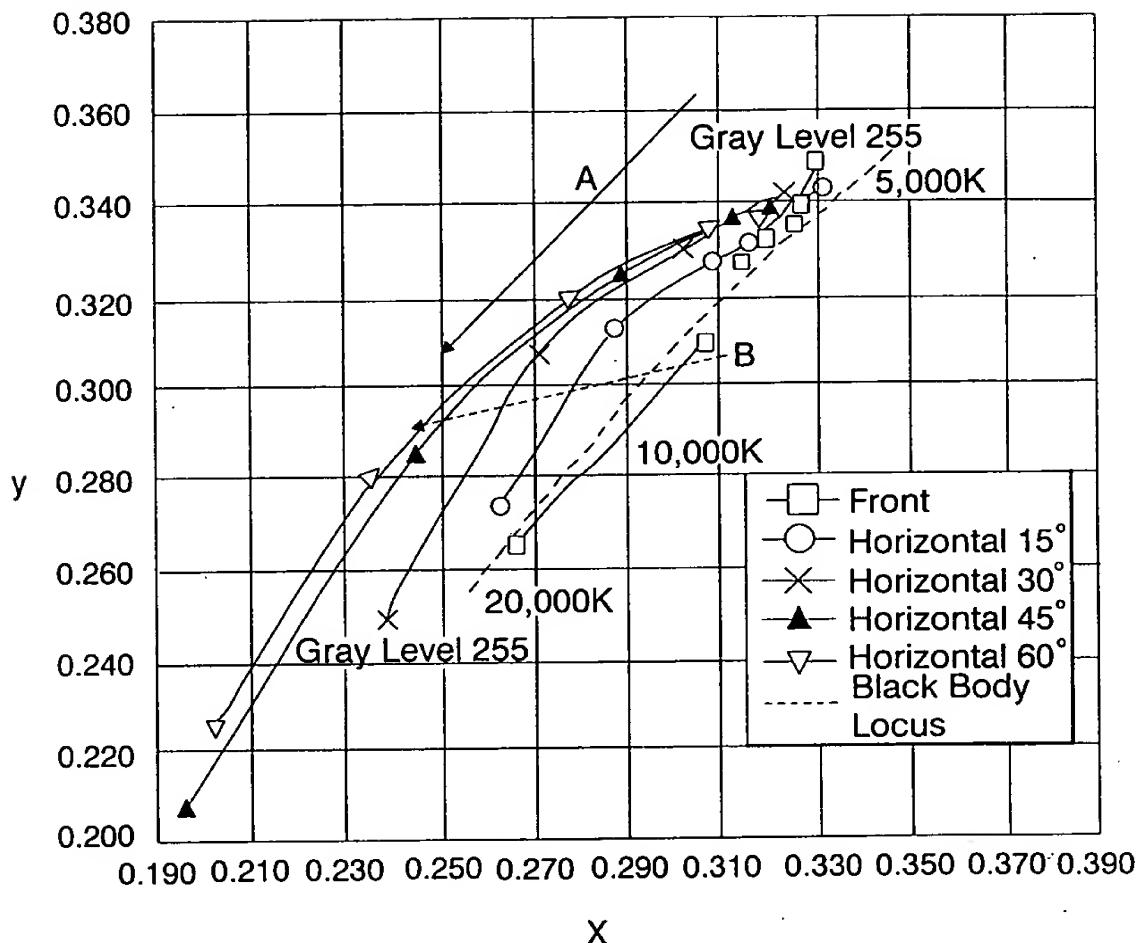


Prior Art

FIG. 8



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Prior Art

FIG. 9